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THE STANDARDIZATION OF WATER METERS—DISK TYPE¹

BY R. K. BLANCHARD²

Although the advantages of standardization have been acknowledged for many years in almost every industry and more or less perfunctory attempts have been made in various industries toward its accomplishment, actual standardization was rare up to the memorable days when the great world conflict appeared to test the skill and valor of millions of people.

We in America, as well as the peoples of most European nations, had accepted for years the many seemingly small departures from uniformity in design and construction with but little concern. When an almost superhuman demand was made, however, upon every manufacturing industry to supply the materials of war in quantity and quality previously undreamed of, then and not until then did this matter of standardization call forth serious consideration on the part of engineers and manufacturers.

The foreign governments were the first to learn the great advantage of a uniform name for a given object, a uniform test for a particular device, and a uniform complete specification of acceptance for almost every conceivable manufactured article. National boards of standardization with almost unlimited powers were established in Belgium, France, Canada, Italy, Sweden, Switzerland, Germany and Australia—all of which were similar in form of organization and method of operation to the British Engineering Standards Association, established in 1901, which has been a dominant factor in the development of British industry.

In America as in Europe the greatest advantages of standardization were learned through our experiences in the World War, with the result that to-day we have what is known as the American

¹ Presented before the Cleveland Convention, June 7, 1921. Discussion is invited and should be sent to the Editor.

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Engineering Standards Committee, a body representing the six national engineering societies, five governmental departments and thirteen national industrial associations.

During the past ten years there has been an increasing demand for standardization of water meters. Many complex problems, presented to both manufacturers and operators, finally brought together the water meter manufacturers at various times when the several problems for discussion were considered from every possible point of view.

Although these informal meetings had been held for several years, at which time discussions on various problems involving standardization were held, it was not until 1916 that a more or less formal organization of all the meter manufacturers was completed to consider the following subjects, constantly being brought up by water works superintendents, engineers and operators.

- (1) Uniform definitions of technical terms used in conjunction with water meters;
- (2) Demand for uniform over-all length of water meters—making meters of various makes interchangeable, size for size, in the same pipe line;
- (3) Uniform length and design of couplings;
- (4) Uniform threads on spuds of meters;
- (5) Uniform flanges;
- (6) Standard tests and capacities for disk meters;
- (7) Standard tests and capacities for current meters;
- (8) Standard tests and capacities for compound meters;
- (9) Standard guarantees to meet all requirements of the water works operator;
- (10) Standard materials to be used in various parts of meters;
- (11) Standard form of contract;
- (12) A standard general specification which would be satisfactory from every possible point of view to both the water works fraternity and to the manufacturer of meters.

Some of the subjects mentioned had been brought up for discussion at the annual meeting of the American Water Works Association and the New England Water Works Association. Standardization Committees from both Associations were appointed and worked independently of one another. On account of the infrequency of meetings brought about by the members of the Committee being so widely scattered, no results of value were obtained until a joint committee representing both associations was appointed to

cooperate with the Committee of the Meter Manufacturers. This latter committee³ had been holding regular meetings, had made real progress and, in a limited way, had put their results into practice.

At this point the writer, as Chairman of the Standardization Committee of the Meter Manufacturers, wishes to express an appreciation for the hearty coöperation extended to the meter manufacturers by the members of the Joint Committee of the American Water Works Association and of the New England Water Works Association. Without this coöperation and help it would have been impossible to accomplish what has been done. At the same time, it is only proper that the manufacturers, on whom possibly the greater burden had fallen, should have some acknowledgement. It has been the writer's privilege to be present at practically all the meetings of the manufacturers and, in his opinion, no more constructive work could have been accomplished.

In any discussion where two distinct points of view must be considered, there are bound to be differences of opinions. The work in conjunction with the Joint Committee of the Water Works Associations and the manufacturers was always done in a spirit of coöperation. The manufacturers always endeavored to meet the suggestions of the Water Works Committee or to produce scientific information sufficient to show that a certain proposal would be impractical.

In this way the members of the Joint Committee held meetings with the manufacturers at which time the different parts of the specification prepared by the manufacturers were discussed, revised and, in many cases, entirely changed to meet the requirements of the water works operator, until finally the present Standard Specification was adopted by the Joint Committee for presentation to the members of the American Water Works Association at the annual meeting in Cleveland, and to the New England Water Works Association at the annual meeting to be held in September at Bridgeport, Conn.

From the point of view of both the water works operator and the manufacturer, we must remember that no single specification can cover every possible condition which may arise. The specification as it now stands, however, should answer a long felt demand for a simple but thorough specification which will permit both the large and small water works operator to be certain that meters ordered

³ The report of this Committee was submitted and adopted at the Cleveland Convention, June 9, 1921. See JOURNAL, May, 1921, page 273.

thereunder will prove satisfactory and will provide the necessary protection as to construction and accuracy.

Almost every water works man has been confronted many times with the annoying task of having to write up his own specifications, requiring much time and thought and, in most cases, many changes before it was acceptable to both the water works man and the manufacturers.

With the specification as it stands to-day, the water works operator need simply specify that meters shall be made according to "Standard Water Meter Specifications" and thus he may eliminate even the necessity for forwarding a complete copy of these specifications. The importance of this fact alone cannot be overestimated, particularly to the small water works operator whose knowledge of specifications naturally is somewhat limited.

It is to be noted that only the Standard Specifications for Disk Meters has been presented for consideration at this time. Both the Joint Committee and the manufacturer's, however, are at present giving thought and attention to the other types of meters. In due course of time these specifications will be submitted to you for discussion and approval.

On account of the limited time which is allowed, it will be impossible to discuss each of the several paragraphs of the specification. It is of interest to note some of the points which have been brought out in the several discussions which have led up to the completion of this specification. It should be mentioned that every one of these conditions has been brought up by the water works operator.

1. Demand for uniform overall length of water meters—making meters of various makes interchangeable, size for size

Previous to the time of the meetings held by the manufacturers, there were six different overall lengths of meters being build in the $\frac{3}{8}$ -inch size. The same conditions existed in the case of the $\frac{1}{4}$, 1, $1\frac{1}{2}$ and 2-inch sizes. Many times, as we all know, it is necessary to remove a meter from a service line for repair and test. With the different lengths of meters it was almost always necessary to replace the meter removed with one of the same make and type. Frequently the meter department would not have on hand this same make and type of meter, with the result that much trouble would be caused and time consumed in ordering a new meter to take the place of the

one removed. The manufacturers, realizing this condition, finally agreed on a standard overall length of $7\frac{1}{2}$ inches in the case of the $\frac{5}{8}$ -inch meter. This one change necessitated a complete change in construction of the $\frac{5}{8}$ -inch meter by four of the different manufacturers and involved a considerable cost for new patterns, tools, etc. Almost the same condition existed in all the sizes of disk meters. A standard length, however, was agreed upon and all the companies today are making all sizes of disk meters to conform to this standard.

2. Uniform length and design of couplings

As in the case of overall length of meters, an even worse condition existed with respect to couplings. In the regular $\frac{5}{8}$ -inch couplings there were six different overall lengths in use, each being different in design. After careful thought, a standard was adopted which is now being made by all the companies so that meter couplings will be interchangeable.

3. Uniform threads on spuds of meters

A careful analysis of thread dimensions was made and it developed that no two manufacturers had the same standard thread for the same size of spud. The result was that a modified Briggs standard pipe thread was adopted for both the male threads on the spuds of the meters and the female threads on the coupling nuts. At the present time, any make of meter may be used for replacement with the assurance that a tight joint will be made—a condition which never before existed.

4. Standard tests and capacities for disk meters

In the discussions on the subject it was the aim of the manufacturers to provide a test which would be fair in every way to both water works operator and manufacturer. In the tests as shown in the specification, there is hardly a case where the meters will not test somewhat better than shown on the limits set. Some discussion arose as to whether or not there should be a rate of flow lower than that mentioned under "Minimum Test Flow" which would show the rate of flow where the meter *started* to operate with no limits as to accuracy. It was finally agreed, however, that if a meter would register within a certain limit of accuracy on the comparatively

low flow mentioned, no necessity would exist for a lower rate of flow test with no accuracy requirements.

5. Standard flanges

All meter flanges have been redesigned to meet what is known as the "American Standard" which was adopted in 1914 by the American Society of Mechanical Engineers and by most of the other technical societies.

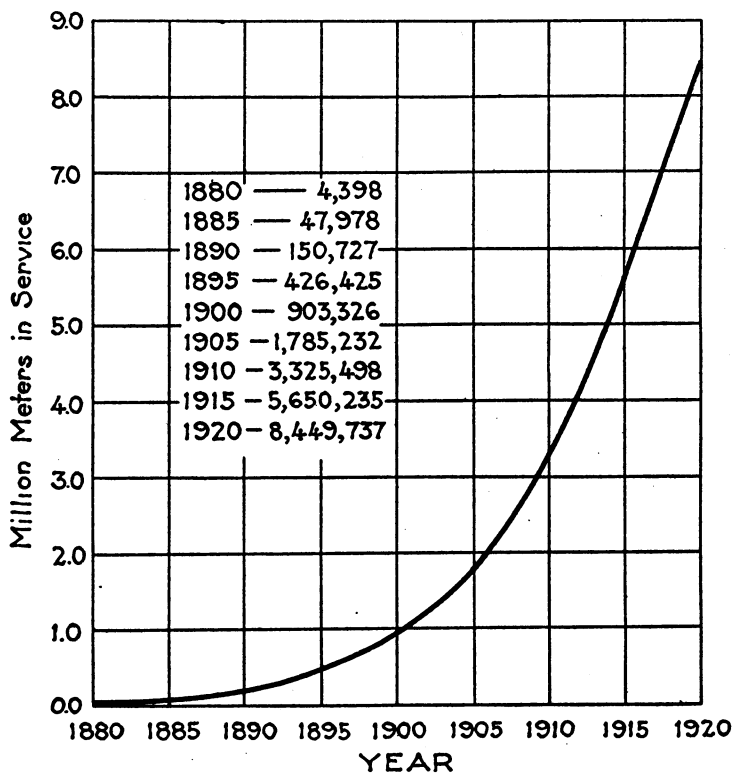


FIGURE 1

The above subjects are mentioned merely to show the care and thought which was devoted to practically every paragraph of the specification.

The necessity for a standard specification on water meters is particularly emphasized by the increasing use of meters throughout the country. In the year 1920, approximately 8,449,737 meters were

in service and figure 1 indicates clearly the attitude of the present day water works superintendent and the public toward meters. In 1880 there were only 4,398 meters in use; in 1890, 150,727; in 1900, 903,326; in 1910, 3,325,498 and in 1920, 8,449,737. These figures offer conclusive evidence that old objections to the water meter have been overcome by the sound economic principle of paying for what you use.

As previously stated, the present specification represents the best thought of some of our members and meets with the approval of the Committees of the Water Works Associations and of all the Meter Manufacturers excepting the Gamon and Badger Meter Companies. These companies were requested to take part in the discussion and were forwarded all information as to the progress being made. It is to be hoped that, after your careful consideration, it will be your pleasure to adopt this "Standard Specification for Water Meters" which will mark an accomplishment that has long been needed and desired.